SAND AND GRAVEL MINING IN THE MEKONG RIVER
Results of the 2011 WWF survey

Jean-Paul Bravard, Univ. of Lyon, France
Marc Goichot, WWF GMP, Vientiane
Mapping: Stéphane Gaillot, SAM Lyon, France

Phnom Penh, 23 May 2012
WWF Meeting
CONDITIONS OF THE SURVEY

• A questionnaire has been submitted to all extraction sites in Lao, Thailand and Cambodia, and the answers obtained in the field.
• The questions deal with:
  – the nature of sediment extracted,
  – the number of employed people,
  – the extraction machines for all sites.

For large sites, an interview has been performed in complement:
- The calendar in the year,
- The quantities produced per year,
- The demand trend,
- The changes in quantities extracted

Houaylao site
Extraction from a sand bar
The size of the circles is proportional to the cubic root of the extracted volume.

Red = sand
Orange = gravel
Brown = cobbles

Extraction sites and extracted volumes

141 sites grouped into 29 clusters

Some sites could not be positioned (problem of GPS position)

SITES have been forgotten or not found

Volumes are probably underestimated

The size of the circles is proportional to the cubic root of the extracted volume.
Beginning of extraction

- Red: year 2011
- Orange: 2-5 yrs
- Orange light: 5-10 yrs
- Beige: > 10 yrs

Trend of extracted quantities

- Red: increasing
- White: stable
- Green: decreasing

Grey: no data
### Demand trend

- Red: increase
- Yellow: stable
- Green: decrease

### Availability trend

- Red: increase
- Green: decrease

... for fine & coarse sand, gravel, cobbles
Extraction site downstream of Vientiane (Ph JPB)
Extraction on an emerged gravel bar and using a dredge downstream of Vientiane
Sand fill on the alluvial plain south of Phnom Penh
## BEGINNING OF EXTRACTIONS

<table>
<thead>
<tr>
<th>Reaches</th>
<th>1 yr</th>
<th>2-5 yrs</th>
<th>5-10 yrs</th>
<th>&gt; 5-10 yrs</th>
<th>&gt; 10 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upst. Vientiane</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vientiane-Savannaketh</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Savannaketh - Champasak</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cambodia-upst. Kompong Cham</td>
<td>3</td>
<td>4</td>
<td>11</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Cambodia- Vietnam border</td>
<td>3</td>
<td>14</td>
<td>18</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>25</td>
<td>31</td>
<td>2</td>
<td>15</td>
</tr>
</tbody>
</table>

No data from Thailand
# EXTRACTION IN RIVER REACHES

<table>
<thead>
<tr>
<th>Reaches</th>
<th>1000 x m³/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sand</td>
</tr>
<tr>
<td>Upst. Vientiane</td>
<td>87</td>
</tr>
<tr>
<td>Vientiane-Savannaketh</td>
<td>4154</td>
</tr>
<tr>
<td>Savannaketh - Champasak</td>
<td>341</td>
</tr>
<tr>
<td>Cambodia-upst. Kompong Cham</td>
<td>580</td>
</tr>
<tr>
<td>Cambodia- Vietnam border</td>
<td>18160</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>23322</strong></td>
</tr>
</tbody>
</table>
## Extractions by State

<table>
<thead>
<tr>
<th>Reaches</th>
<th>1000 x m³/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sand</td>
</tr>
<tr>
<td>LAO</td>
<td>904</td>
</tr>
<tr>
<td>THAILAND</td>
<td>3678</td>
</tr>
<tr>
<td>CAMBODIA</td>
<td>18740</td>
</tr>
<tr>
<td>VIETNAM</td>
<td>23322</td>
</tr>
<tr>
<td>TOTAL</td>
<td>23322</td>
</tr>
</tbody>
</table>
COMPARING MINED VOLUMES AND MEKONG SEDIMENT TRANSPORT

- The total volume of declared extracted sediment from the Mekong in 2011 is 27 000 000 m³ = 43.2 millions tons
- The real amount of extractions is probably more important.
- **Part of sand transits as suspended load, part as bedload, depending on flood discharge**
- The estimated sediment discharge is estimated 145-160 millions tons. It is usually considered as (mostly) composed of « fines » = silt and clay
- **The total suspended load is more important than considered so far. It must be reassessed.**
WHAT CONSEQUENCES OF SEDIMENT HARVESTING FOR THE MEKONG RIVER-DELTA SYSTEM?

• The sensitivity of sand transport to conditions of energy during floods (bed load vs suspended load) must be taken into account when dealing with the impact of reservoirs = **Trapping deeply affects sand transport, more than fines.**

• **Sediment harvesting along the Mekong channel affects downstream transit** since extraction sites trap sediment from upstream due to modifications of geometric parameters. It decreases input to the sea.

• The ongoing retreat of coastline is probably due to the consequences of dredging and trapping in the Cambodian and Vietnamese reaches.
Thank you for your attention